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ABSTRACT

This guide is designed to help school administrators, teachers, and school board members see the benefits of cooperation between vocational and academic teachers. It also looks at the barriers, examines models for cooperation, and describes exemplary practices. The guide considers the impact of cooperation in the work environment and provides a framework for teacher cooperation. Barriers to cooperation and principles to enhance cooperation are listed. Successful illustrative practices for integrating academic and vocational education are grouped into five categories: those occurring (1) within a single class, (2) between two classes, (3) across a school, (4) beyond the school, and (5) at the state level. Guidelines are also suggested for the support roles to be played by principals, central office staff, the state department of education, community employers, and teacher training institutes. Summaries of two guides for teacher cooperation and an annotated bibliography are appended. (YLB)

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THE Northwest Regional Educational Laboratory

PROGRAM REPORT

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A GUIDE FOR ENHANCING COOPERATION BETWEEN VOCATIONAL AND ACADEMIC TEACHERS

Prepared by

Thomas R. Owens
Education and Work Program

November 1987

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November 30, 1987

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The preparation of this Guide was based on school observations, and with many teachers and administrators in the Northwest. As part of the Northwest Regional Educational Laboratory's (NWREL) work on improving secondary vocational education, Dr. Thomas Owens conducted case studies on collaboration between academic and vocational teachers at Benson High School in Portland, Oregon and in high schools in Idaho participating in the Idaho Basic Skills Project. Staff at Weiser High School in Idaho contributed especially to the examples of successful practices described here.

I wish to especially thank Carol Matarazzo, vice-principal at Benson High School, and Elisabeth Radcliff, project coordinator of the Idaho Basic Skills Project, for their constructive review of the draft of this Guide. Appreciation is also expressed to Carolyn Buan, who edited the Guide, and to Peggy Peters, who provided the word processing and layout of the Guide.

INTRODUCTION

In a number of school buildings across the country today, one can find banners proclaiming that they care about excellence in education. While school improvement efforts are being developed in some schools, they seldom seem to include the area of vocational education. For vocational education to be included in the excellence movement, it must be shown to be an integral part of the total education system. One way to do this is to demonstrate that vocational objectives contribute to the overall education of today's youth. Another is to help vocational and academic teachers learn to work together. However, working together is not something their schooling has prepared them to do. If this cooperation is to occur, new initiatives are needed.

There are at least five reasons for vocational and academic teachers to work together:

1. Recent research shows that vocational students often perform inadequately in basic skills. By working together, vocational and academic teachers can help reinforce basic skills development.

2. Vocational students are sometimes taught facts and processes, without understanding the concepts underlying them. By working closely with academic teachers, vocational instructors can better explain these concepts.

3. Academic teachers often complain that their students fail to see the relevance of the material they are being asked to learn. Collaboration of academic and vocational teachers can help students see the real-world applications of their academic subjects.

4. In today's workplace, employee teamwork is valued. Employers consistently site a cooperative attitude and ability to work with others as a very important element in employee success at all levels. However, outside athletics and extracurricular activities, schools seldom teach about teamwork. In schools where academic and vocational teachers work together, students can observe meaningful role models of cooperation.

5. Teaching the same discipline for a number of years becomes boring. The excitement teachers feel when working together across disciplines can help reduce burnout.

This guide is designed to help you see the benefits of cooperation--and the barriers. In it, we examine models for cooperation and describe exemplary practices.

The guide is intended for school administrators, teachers, and school board members.

EXTERNAL ENVIRONMENTS

The United Way of America's forthcoming book, The Future World of Work, portrays a changing work culture that includes "a wide array of largely self-managing structures: networks, multi-disciplinary teams, and small groups. The traditional top-down authoritarian management style is yielding to a networking management style; each employee is a resource for every other employee and each worker gets support and assistance from many different directions."

John Naisbitt and Patricia Aburdence, in Re-Inventing the Corporation, talk about new corporate structures involving cross-disciplinary teams and partnerships. Jeffrey Hallett, in his new book Worklife Vision contrasts traditional workplace organization, which was based on competition, with modern organization, which is based on cooperation.

These are just a few testimonials to the increasing attention being paid to cooperation in the workplace, cooperation for which educators must prepare young people.

How can educators do this? First, teachers can serve as role models--examples of good teamwork. Second, the public must recognize that teachers need not be experts in a field or have all the answers. In a society whose knowledge base doubles every 10 years, this expectation is no longer realistic. However, teachers can help students recognize what they don't know, obtain the knowledge and skills they lack, and to appreciate the interrelatedness of various disciplines.

Teachers can also help students prepare for the future workplace by teaching them how to set group goals and priorities.

Some of the schools the author has visited this year have modeled good goal and priority setting. For example, several high schools in Idaho's statewide Basic Skills Project have identified a need for students to improve their written communication and have developed ways that all teachers--both academic and vocational--can join forces to require written assignments that meet prespecified standards.

FRAMEWORK FOR COOPERATION

A conceptual framework, such as that shown in figure 1, can be useful in identifying the factors that influence cooperation between academic and vocational teachers and the student and teacher benefits resulting from it.

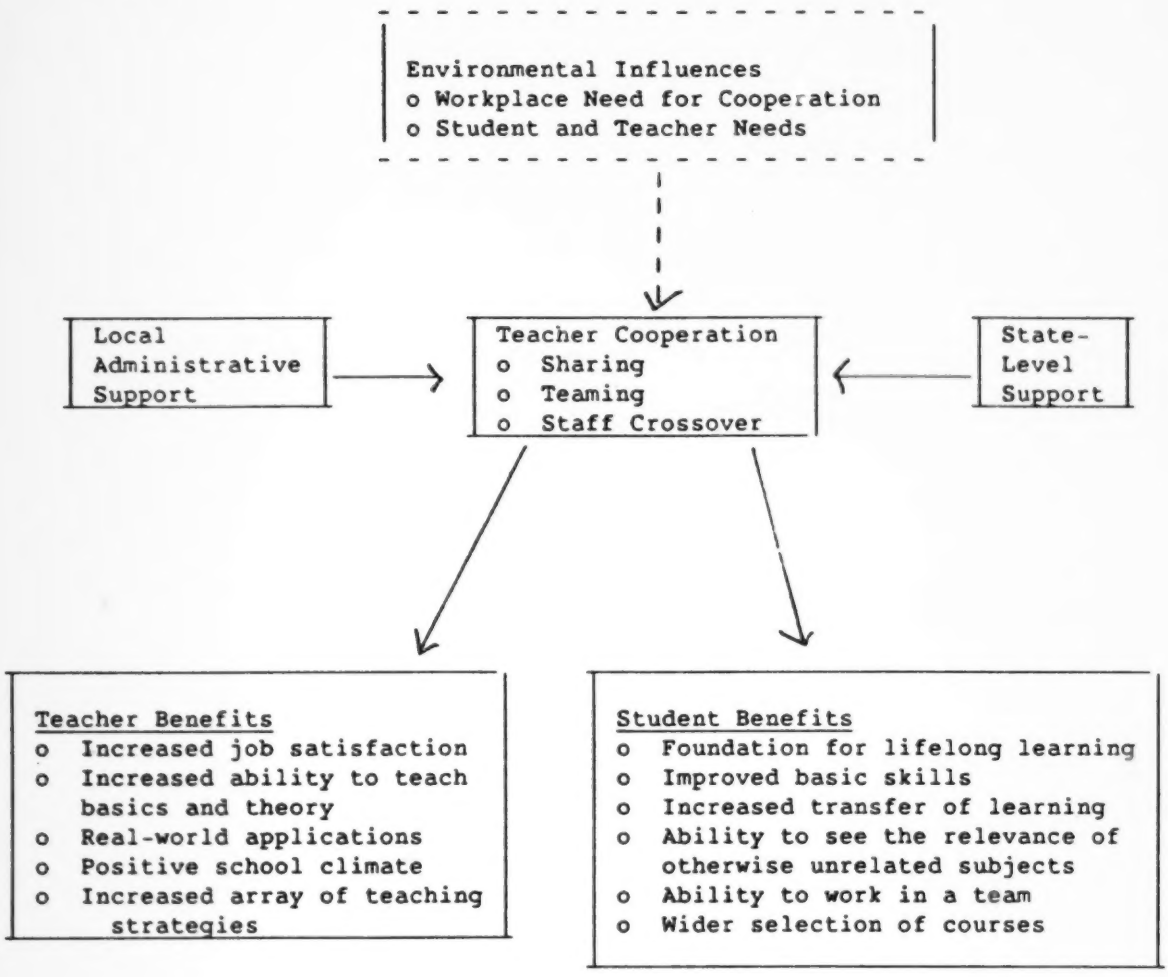
As we have seen, the future workplace requires cooperation rather than competition, skill in acquiring, rather than remembering, new knowledge, and practice in solving problems.

Such workplace skills can be developed today by teachers who are willing to learn them and by administrators who act on the belief that cross-department cooperation is beneficial to teachers and students.

The need for cooperation comes not only from the workplace, but also from the needs of students and teachers. Teacher needs include those for job satisfaction and the rewards of seeing students see relevance in what they are learning. Student needs include the need for applying what they learn and the satisfaction of working with each other.

FIGURE 1

A FRAMEWORK FOR TEACHER COOPERATION


Environmental Influences
o Workplace Need for Cooperation
o Student and Teacher Needs
Local Administrative Support
Teacher Cooperation
o Sharing
o Teaming
o Staff Crossover
State-Level Support
Teacher Benefits
o Increased job satisfaction
o Increased ability to teach basics and theory
o Real-world applications
o Positive school climate
o Increased array of teaching strategies
Student Benefits
o Foundation for lifelong learning
o Improved basic skills
o Increased transfer of learning
o Ability to see the relevance of otherwise unrelated subjects
o Ability to work in a team
o Wider selection of courses

This recognition of the importance of teacher cooperation in order to help students then needs to be effectively communicated to teachers. Just as business leaders need to establish and communicate a vision of what is needed and establish priorities and strategies for achieving it (as described by Peters and Waterman in their book In Search of Excellence), so do school administrators. More details about this are provided in Chapter V. Support is also needed at the state level. In many states, however, vocational education staff members seldom see or interact with others in the department of education. As a first step, these staff have to learn about one another and examine how they can work together to support all students. Once this is done, language arts supervisors can provide workshops to vocational and academic teachers explaining how to enhance written skills, regardless of the subject area taught. With local and state support, high school staffs can creatively demonstrate cooperation.

In their publication from the National Center for Research in Vocational Education, Techniques for Joint Effort: The Vocational-Academic Approach, Pritz and Crowe describe three cooperative models: for sharing, teaming, and staff crossover. In sharing, academic and vocational teachers use the same curriculum plans and resources. In teaming, vocational and academic teachers develop a correlated course of study and share teaching. In staff crossover, teachers exchange roles and may teach each other's classes.

In presenting this framework, we recognize that teacher cooperation is unlikely to be enthusiastically embraced unless teachers are convinced that there are real benefits not only for students but for themselves. Therefore, it is important to note at least four teacher benefits that can be demonstrated. First, vocational teachers learn effective strategies for teaching basic skills and for teaching the theories that lie behind occupational skills. In return, academic teachers learn to help students apply their basic skills to careers that interest them.

Increased cooperation can lead to a general sense that teachers use working as a team to build a positive school climate and attain schoolwide goals. This feeling of teamwork can be fun and generate excitement in teachers who have become bored, frustrated and lonely. Finally, teachers can acquire new teaching techniques, as did one high school math instructor who worked with a drafting teacher to develop computerized applications of math.

All of this discussion about teacher cooperation would be pointless if it failed to have positive benefits for students. A payoff for vocational students should be an improvement in their basic skills applications and in their ability to transfer learning across disciplines. Academic students learn real-world applications of what could otherwise appear to be unrelated subjects. Students in both tracks learn the skills of cooperation, and, where equivalent credit is available, students can choose from a wider selection of courses.

Barriers to Cooperation

Site visits and interviews with academic and vocational teachers in schools where there is a commitment to working cooperatively have revealed a number of potential barriers to teacher cooperation, many of the same barriers were identified during the Idaho Basic Skills Project summer workshop. They include:

- lack of administrative support
- inadequate time for meetings and exchange of ideas
- feelings of isolation and uninvolvement among some teachers
- unwillingness to step outside of one's own discipline
- negative attitudes and "finger pointing" among some teachers
- increased state graduation requirements involving more academic coursework
- the threat of change
- concern about extra work involved
- perception that cooperation is just another passing fad
- increased costs for staff development and teacher release time
- limited educational backgrounds of some vocational teachers with restricted certificates can create anti-intellectual biases

Principles Enhancing Cooperation

Schools striving for better cooperation also had insights about what is needed to facilitate cooperation:

- adequate time for teachers to plan and work together
- strong administrative support and direction
- teachers' self-confidence
- trust and respect for the other teachers' competencies
- an open environment that encourages experimentation and allows for failures
- teachers' awareness that cooperation is expected
- schoolwide recognition that change is slow and sometimes painful
- the joy of seeing students accrue benefits from teacher cooperation
- contributions from, and appreciation of, the local business community
- personal recognition by administrators and those outside the school

SUCCESSFUL ILLUSTRATIVE PRACTICES

Successful practices for integrating academic and vocational education can be grouped into five categories: 1) those occurring within a single class; 2) between two classes; 3) across a school; 4) beyond the school; and 5) at the state level.

1. In Class

   - In a math class, students are required to measure the same lengths with several measuring tools that are used in home economics. They study units of length, compare the quality of tools involved, learn to double-check their calculations, and master methods for measuring difficult-to-reach areas. Measuring devices include tapes, protractors, and T-squares.

   - Teachers in a Principles of Technology class show videotapes demonstrating how concepts from physics are being used in various occupations.

   - A math teacher uses Ohm's law as an example in the algebra class.

   - A language arts teacher wants students to understand roadblocks to communication. She explains different types of roadblocks such as ordering, threatening, preaching, blaming, psychoanalyzing, and name calling. Each roadblock is put on a note card and students are given one to roleplay, using their personal or work experiences.

   - A home economics teacher asks students to plan and prepare an unexpected meal for someone special in 30 minutes using only groceries on hand. Students must use brainstorming techniques they were taught, and evaluate two or three possible choices.

   - An industrial mechanics class has students learn sequencing to perform a job skill at the same time that they practice written and oral communication. Students select a skill to demonstrate, write out step-by-step instructions, have another student observe them following the directions in proper sequence, recite the directions (checking for grammatical errors), and then give oral directions to a different student to see if that person can perform the skill desired.

2. Between Classes

   - Vocational teachers make up a weekly list of occupational terms that students must learn to use and spell correctly in their English class.

- In electronics class juniors study direct circuits, while in science they analyze electronic motors.

- A business education teacher provides a sample form letter and suggestions for agriculture students who need to write away for free or inexpensive farming materials.

- Science and vocational education teachers work together to develop and operate an environmental science class in a 40-acre woodland nature preserve. Among other things, students construct salmonoid egg-hatching boxes and establish a migratory fish run in a local stream. Biology and botany classes identify trees and plants, which woodworking and metals classes mark with specially designed plaques.

- Vocational students are tested in math, and those with low scores are tutored twice a week by volunteer students from their particular occupational areas. Each student has a list of skills to be mastered and can proceed at his/her own pace.

3. School Level

- Academic and vocational teachers have set up a schoolwide problem-solving program for students, and a file of problem-solving exercises has been set up for teachers in the staff resource center.

- In a schoolwide oral language project, teachers agree to help students spot and overcome the use of double negatives, incorrect verb tenses, and improper usage.

- Recognizing the need for students to use better study skills, teachers at a junior high school write a one-week curriculum on study skills for use by all teachers in the first week of school.

- Vocational teachers conduct informal classes several evenings for other teachers who want to learn more about a vocational area.

- The Basic Skills team in Idaho distributes problem-solving posters to the rest of the faculty who display them. Charts explaining the elements of good writing are also used.

4. Beyond the School

- Seniors interested in learning the math needed for a technological society receive instruction from their vocational-technical teachers, who invite local tech-college instructors to consult with them and their classes.

- As one way of gaining first-hand experience in writing, students in a cooperative office education program interview secretaries or general office workers and request sample letters and memos for review.

- Students enhance basic math skills by preparing a monthly budget to determine how much money they need to make in their entry-level positions. Families support the project by helping students determine costs for utilities, insurance, and other monthly living expenses. Others in the community are asked to provide information about prices.

5. State Level

- Interagency articulation seminars initiated this year in Idaho bring together key staff from the State Department of Education and the State Division of Vocational Education. This group has planned and initiated a statewide Basic Skills Project in ten districts and is discussing Principles of Technology, Applied Math, and Applied Communications.

- A one week Linear Measurement Unit, developed by the Basic Skills Project in Idaho, has been distributed to all trade and industry instructors in the state, as well as to all Basic Skills team members in 10 districts. This unit can be taught in math or vocational courses to fill the gap found in students' understanding of measurement.

GUIDELINES FOR SUPPORT

If collaboration between academic and vocational teachers is to become a reality, principals, central office staff, the state department of education, community employers, and teacher training institutes have important support roles to play.

Principal

Recent research on school effectiveness has demonstrated the critical nature of the principal's role. As the school's visible leader, the administrator can offer essential enthusiasm and support for collaboration between teachers. More than that, he/she can and should: (1) help teachers see the payoff to students and themselves; (2) identify and form a team that can help plan strategies for breaking down barriers and building teamwork; (3) provide adequate time for teachers to plan and work together; (4) recognize and reward teachers who demonstrate good teamwork; (5) encourage teachers to trust and respect their colleges' competencies; (6) develop an environment that encourages experimentation and allows for failures; (7) make teachers aware that cooperation is expected and will be built into their evaluations; (8) identify staff-development needs related to cooperative models and processes; (9) evaluate teacher cooperation each year and build in improvements; (10) develop a set of local policy procedures for awarding equivalent credit in academic and vocational areas when such arrangements are desired; and (11) keep the central office staff, parents, and community informed about these changes and their benefit to students. For several excellent examples of procedures for forming collaboration across teachers, see Appendix A. It contains a summary of steps contained in an Administrator's Handbook for Assembling a Basic Skills Team and Starting a Basic Skills Project, and in A Step-by-Step Guide to Integrating Science Concepts and Vocational Skills in the High School Classroom: The Sandy Union High School Experience.

Central Office Staff

The superintendent and central office staff need to consider some of the same points mentioned for the principal. In addition, they should: (1) work with the school board to prepare a district policy that encourages teacher collaboration; (2) establish policies and procedures regarding the awarding of equivalent credit; (3) ensure that academic and vocational supervisors meet to discuss how they themselves can work together; and (4) develop strategies to allow curriculum consultants a wider audience of teachers than those in a single discipline. For example, language arts supervisors should be encouraged to help vocational teachers improve the technical writing skills of their students.

State-Level Staff

Vocational and academic support staff from the state can collaborate in these same ways. In addition, they can: (1) consider including some academic curriculum specialists or vocational accreditation site visit teams; (2) look for ways to obtain and use outside funds to benefit the academic development of all students; (3) identify incentives for at-risk youth to stay in school by developing programs or strategies that show work applications for some of their academic subjects; and (4) articulate a coherent philosophy and show how each academic and vocational offering contributes to that philosophy.

Employers

Employers can help improve cooperation between academic and vocational teachers by: (1) inviting them to their companies to see how basic skills are applied in many jobs; (2) talking to students in both vocational and academic classes about the broad set of skills employers expect in those they hire, including the ability to work as a team; (3) consider summer internships for teachers to give them a taste of working on a team; and (4) expecting that the school have a clear philosophy of education and curriculum that includes skills relevant to the workplace.

Teacher Training Institutions

In the past, teacher training institutions have tended to prepare high school teachers for the curriculum area they will teach. In the future, these institutions may want to: (1) require that those in all curriculum areas learn how to introduce and reinforce basic skills development in their students; (2) provide vocational teachers with a minor in at least one academic area so that they are prepared to teach both academic and vocational courses; (3) develop ways for college vocational and academic teachers to model the collaborative process; (4) develop inservice workshops for classroom teachers to improve their ability to work cooperatively; and (5) conduct research and review the literature on processes for enhancing teacher cooperation.

APPENDIX A

Summary of Two Practical Guides

The Sandy Union High School Project To Integrate Science Concepts and Vocational Skills in the High School Classroom

At Oregon's Sandy Union High School, students are offered a combined science/vocational education course entitled Environmental Science, which takes place in a 40-acre nature woodland nature preserve that abuts the campus. The course and the process teachers and administrators used to establish it are described in a booklet entitled, A Step-by-Step Guide to Integrating Science Concepts and Vocational Skills in the High School Classroom.

The nature site has been developed by students from the Environmental Science course and by other classes that were called upon as the need arose. Activities included clearing brush; surveying and layering out a trail, which both school and community now use for walking, jogging, and cross-country training; designing and building a fitness course (complete with attractive signs); identifying plants with student-made plaques, building signs and benches along the trail, surveying and constructing two ponds, bridges, and a dock for handicapped students; and stocking the ponds with trout.

Classes that collaborated in the project included drafting, woodworking, metals, biology, forestry, botany, zoology, and physical education.

> Students in drafting helped lay out the trail and made sketches for the bridges. Forestry students helped influence the layout of the trail by assessing the topography of the entire area and identifying plant and animal species. These same forestry classes were able to see firsthand the importance--in good timber management--of thinning trees. In the process, they discovered one huge old-growth Douglas fir. To estimate its age, they invited a timber expert to speak to their class.

Now biology, botany, and zoology classes use the preserve to study plants and animals, the canoeing class will use the pond, physical education students train on the trail and fitness course, English students are sent there to write, and it is likely that art and photography students will follow suit. The preserve is also popular with the community, including many retired people, who use it year round.

The process for achieving the unusual degree of cooperation and enthusiasm that made the program possible is spelled out in Sandy's booklet. As a first step, the administration (led by an extremely supportive principal) surveyed teachers to see what science and vocational programs they felt could be combined and how this might be done. Those teachers who responded to the survey wre enthusiastic and became the group that later attended a two-day brainstorming session. This session was used to identify topics, strategies, and resources that could make up a combined course. Later, a smaller group fine-tuned the planning, making sure that the resulting course would meet state requirements in both vocational and academic areas. (What planners

could not know was the degree of cooperation that would take place with other existing courses.) The booklet also describes the teacher selection, evaluation, and community involvement aspects of the project.

Information about the project is available from: Dennis Crow, Principal, Sandy Union High School District #2, 17100 Bluff Road, Sandy, Oregon 97055, (503) 668-8011.

Idaho Administrator's Handbook for Assembling A Basic Skills Team and Starting a Basic Skills Project

Idaho's Basic Skills Project began in 1986 as a cooperative venture between the State Department of Education and the State Division of Vocational Education, whose aim was to improve students' performance in this area. The Administrator's Handbook they produced is offered to help others plan similar projects.

The handbook begins with a survey of administrators to see if they want, need, will support, and can pay for a basic skills team. Next, the booklet offers a chart that helps administrators identify faculty members in 13 academic and vocational areas, as well as administrators and counselors who have expressed interest in a basic skills project, have special training, are active in professional organizations, possess leadership skills, and have time to participate. Another chart helps the administrator keep track of teachers contacted and their responses, and yet another lists team members' schedules.

An outline of information team members will want to have is offered to get things off to a smooth start, and a form entitled "Coming to Consensus" is included. This form is to be completed by individual members and brought to the team's first meeting. It asks teachers to give their definition of "basic skills;" say why students don't learn these skills; indicate what teachers, administrators, and the district need to do; and state "most pressing needs."

More information is available from: Elisabeth Ratcliff at the Idaho Division of Vocational Education, (208) 334-3213.

APPENDIX B

Annotated Bibliography

Crow, D. A Step-by-Step Guide to Integrating Science Concepts and Vocational Skills in the High School Classroom: The Sandy Union High School Experience. Sandy Union High School District #2, 17100 Bluff Road, Sandy, Oregon 97055, 1986.

In addition to describing Sandy's environmental science program, the guide discusses how to plan a combined program, select teachers, use an oversight advisory committee, and evaluate the effort. Sample planning and survey forms are provided.

Duggan, P., and Mazza, J. Learning to Work--Improving Youth Employability. Washington, D.C.: Northeast-Midwest Institute: The Center for Regional Policy, 1986.

This study includes a good chapter on basic skills and site findings from a Brandeis University study showing that the most important factor in persistent youth unemployment is lack of basic educational skills. It identifies some ways that business leaders can help plan basic skills curricula.

Hoffman, Kirby. "Put an Academic Teacher on Your Advisory Committee." Voc Ed Journal, Vol. 60, No. 5, (August, 1985).

The author, a word processing teacher in Pontiac, Michigan, found real benefit when an English teacher was added to his industry advisory committee and when the nonvocational personnel were given important work to perform on the committee.

Incardone, Peter. Teaching Students to Read Better. Professional Development Series No. 6. The American Vocational Association (1410 King Street, Alexandria, VA 22314, 703-683-3111), 1982.

This concise guide for vocational teachers covers issues such as why students have trouble reading, as well as tips in teaching essential technical reading skills, assisting bilingual students, and using other resources on the school staff.

Lotto, Linda S. Building Basic Skills: Results from Vocational Education. Research Development Series No. 237, The National Center for Research in Vocational Education, The Ohio State University, 1983.

This well-done synthesis of the literature on how vocational students compare to "academic track" students provides a good basis for thinking about strategies for improving the basic skills of students in high school vocational courses.

McClure, L. Options for Equivalent Credit in the High School Curriculum: A Guide for Local Decision Making. Olympia, WA: Commission for Vocational Education, 1986.

After defining equivalent credit, the author suggests steps for awarding this credit and addresses nine common questions surrounding the practice.

Norton, R.E., Harrington, L.G., Fitch, C.C., and Kopp, K. Integration of Academic and Vocational-Technical Education: An Administrator's Guide. Athens, GA: American Association for Vocational Instructional Materials, 1987.

This guide was developed by the National Center for Research in Vocational Education as part of a competency-based vocational education administrator module series. It establishes the need for integration of academic and vocational education, describes some integration strategies, and presents 12 examples from various states.

Pritz, S.G., and Corwe, M.R. Techniques for Joint Effort: The Vocational-Academic Approach. Columbus, Ohio: The National Center for Research in Vocational Education, 1986.

This guide describes teaching techniques that vocational and academic teachers can use jointly to improve students' basic skills. It documents evidence establishing the need to link academic skills instruction to applications in vocational tasks if student learning is to be successful. Three options for cooperation are presented: sharing, teaming, and staff crossover.

Ratcliff, E., Administrator's Handbook for Assembling a Basic Skills Team and Starting a Basic Skills Project. Idaho State Department of Education, 1987.

This handbook contains a description and forms administrators can use to set up a statewide program to infuse basic skills throughout the curriculum. The guide is short, clear, and practical.

Suter, Paul. "Teaching a New Kind of Shop Talk." Voc Ed Journal, Vol. 59, No. 5:31, (August, 1984).

This article describes partnership between Suter, a communication skills instructor at Chemeketa Community College in Salem, Oregon, and Bob Dixon, head of the machine/mechanical department on the same campus. The instructors enrolled in each other's classes to get a better idea of how the subject matter interrelates.

Lucille Campbell-Thrane, Building Basic Skills: Models for Implementation. Special Publication Series No. 41, The National Center for Research in Vocational Education, The Ohio State University, 1983.

This report suggests three ways to improve vocational students' basic skills proficiency using integrated (infused in vocational education courses), non-integrated (separate, "tailored" classes), and combination approaches. The author provided a listing of vocational teacher competencies to help students improve their basic skills.

American Vocational Association. Voc Ed Journal Vol. 59, No. 2 (March, 1984).

This issue's theme is "Teaching the Right Stuff: Where It's Happening Today." Six articles by teachers and a former vocational student discuss how academics and vocational programs must be intertwined. Math and science are the dominant themes.

Communication Skills I: Reading Skills, Writing Skills, Using a Newspaper and Communication Skills II: Using the Telephone, Conducting a Meeting, Making a Speech. Division of Vocational Education, State Department of Education, Columbus, Ohio.

These two guides are aimed at vocational teachers who choose to help students increase reading, writing, and general communication skills. Examples from vocational settings are used.

Generalizable Mathematics Skills Assessment User Manual and Resource Directory (2 volumes) Illinois State Board of Education, 1984.

These two manuals by the Department of Adult, Vocational and Technical Education are designed to show teachers how to identify and address the common math skills that cut across a number of secondary vocational programs. Color-coded charts quickly identify basic math applications and tasks from various occupational areas. Student skill inventories are provided. The resource directory lists a wide variety of instructional materials and provides publisher addresses.

Oregon Department of Education and Oregon State University, 1985.

Five handbooks designed for vocational educators looking for ways to reinforce basic skills in vocational classrooms. Titles include: Computer Skills, Mathematics, Reading, Speaking/Listening, Writing. Available at $4.50 each title from Oregon Career Development Consortium, Marion Educational Service District, 651 High Street N.E., Suite 4, Salem, Oregon 97301.

Project STAMM and the Georgia Department of Education. Vocational Applied Mathematics--a series of self-study workbooks in traditional vocational fields. Order auto mechanics, auto body, food services, construction, health occupations, metals, electronics, and electromechanics workbooks from Sopris West, Inc., 1120 Delaware, Longmont, CO 80501. Order industrial arts, cosmetology, drafting, and graphic arts workbooks from Ronda Packer, Vocational Education Materials Center, University of Georgia, Green Street, Athens, GA 30602.

Northwest Regional Educational Laboratory

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The Northwest Regional Educational Laboratory (NWREL) is an independent, nonprofit research and development institution established in 1966 to assist education, government, community agencies, business and labor in improving quality and equality in educational programs and processes by:

- Developing and disseminating effective educational products and procedures
- Conducting research on educational products and procedures
- Providing technical assistance in educational products and procedures
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